



Eye on the Sky

National Weather Service
Louisville, Kentucky

Winter 2000
Volume 1, Issue 4



A Newsletter for Emergency Managers and Core Storm Spotters within our County Warning Area.

A Message from the New Meteorologist In Charge

Welcome to the fourth edition of our *Eye On The Sky* newsletter.

This quarterly public service publication began in Spring 2000 as a partnership and communication conduit between spotters, emergency managers, and the National Weather Service. This edition focuses on valuable and interesting winter weather information, which is also suitable for schools, media, and other appropriate customers.

I want to express my thanks to all of you, our partners. We appreciate your support and involvement in the spotter program and depend upon you for real-time information during severe weather. I want to emphasize just how important you are, not only to us, but to your neighbors across central Kentucky and southern Indiana. In this mutually beneficial partnership, you are our eyes on the ground when severe weather impacts the area. Your vital and timely reports to us are quickly relayed to law enforcement personnel and the media for rapid public dissemination. This ensures that critical, and sometimes life threatening, information gets to your neighbors so they will have time to take necessary actions to protect themselves before severe weather arrives at their location.



Michael Matthews

We continually strive to enhance this publication. We need your input on the value of this service. We are always receptive to your ideas and welcome your suggestions for improvement. Therefore, we have enclosed a brief, concise feedback form and a self-addressed, stamped envelope. Please take a few moments to complete the survey and drop it in the mail at your convenience.

In closing, I personally invite you to come by and visit "your" National Weather Service office. We'd like to meet you, show you our operations, and answer any questions you may have. Let me know if you're interested by calling me at 1-502-968-4933 X 642.

Have a safe winter and happy holidays.

Regards,

Michael Matthews
Meteorologist In Charge

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Wind Chill and Winter Safety

by Norm Reitmeyer

Warning Coordination Meteorologist



After three relatively mild winters in a row, the experts at the Climate Prediction Center are projecting a "normal" winter for central Kentucky and south-central Indiana. This is based on historical data from 1961 to 1990. The result may be more snow, cold and wind than we have seen in recent winters.

The wind chill is based on the rate of heat loss from exposed skin caused by the combined effects of wind and cold. As the wind increases, heat is carried away from the body at an accelerated rate, driving down body temperature.

Wind chill *advisories* will be issued when the wind chill is forecast to be between -20°F and -35°F. Wind chill *warnings* will be issued when the wind chill is forecast to be -35°F or colder. If you must be out in conditions like this, wear loose-fitting, light-weight, warm clothing in several layers. Trapped air insulates.

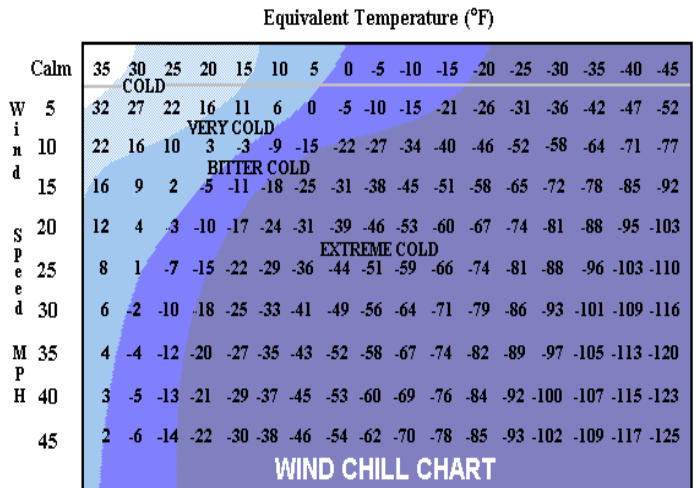
Wear a hat. It has been found that half your body heat loss is through your head. Cover your mouth to protect your lungs. Mittens, snug at the wrist, are better than gloves. Most importantly, try to stay dry. Prolonged exposure to the cold can cause frostbite or hypothermia and become life-threatening. Infants and elderly people are most susceptible.

Frostbite is damage to body tissue caused by that tissue being frozen. Frostbite causes a loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes, or the tip of the nose. If these symptoms are detected, get medical help immediately! If you must wait for help, slowly re-warm affected areas. However, if the person is also showing signs of hypothermia, warm the body core before the extremities.

In cars and trucks, plan your travel and check the latest weather reports before leaving. Fully check and winterize your vehicle before the winter season. Keep your gas tank near full to avoid ice in the tank and fuel lines. Try not to travel alone and let someone know your timetable and routes.

Animals also are affected by wind chill. Move them to

sheltered areas during extreme cold. Haul extra feed to nearby feeding areas. Have a water supply available. Most animal deaths in winter storms and cold are from dehydration.



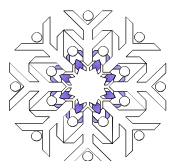
Wind Chill	Possible Effects
30°F or greater	CHILLY. Generally unpleasant.
15°F to 30°F	COLD. Unpleasant.
0°F to 15°F	VERY COLD. Very unpleasant.
-20°F to 0°F	BITTER COLD. Frostbite possible.
-20°F to -60°F	EXTREMELY COLD. Frostbite likely. Outdoor activity becomes dangerous.
-60°F or less	FRIGIDLY COLD. Exposed flesh will freeze within half a minute.

Winter Weather Terminology

by Chad Swain

Winter Weather Program Leader

Winter storms have the capability to completely immobilize large areas of a state or several states simultaneously. Winter storms occur in several forms, such as heavy snow storms, blizzards, and ice storms. Each in its own way is a potential killer of hundreds of people whenever the storm strikes.



W i t h winter right around the corner, the public should familiarize themselves with the winter weather terms used by the National Weather Service in our local forecasts and warnings. Below is a list of these terms.

WINTER STORM OUTLOOK: Issued prior to a Winter Storm Watch, usually 48 to 60 hours in advance of a winter storm. The outlook is given when forecasters believe significant winter weather conditions are possible.

WINTER STORM WATCH: Alerts the public to the possibility of a blizzard, heavy snow, or significant freezing rain or sleet storms. Winter Storm Watches are usually issued 12 to 36 hours before the beginning of a winter storm.

WINTER STORM WARNING: Issued when a combination of heavy snow, heavy freezing rain, and/or heavy sleet is expected. Winter Storm Warnings are usually issued 6 to 24 hours before the event is expected to begin.

HEAVY SNOW WARNING: Issued when snowfall is expected to equal or exceed 4 inches in 12 hours or less, or 6 inches or more in 24 hours or less.

BLIZZARD WARNING: Issued for sustained or gusty winds of 35 mph or more, and falling or blowing snow creating visibilities at or below 1/4 mile; these conditions should persist for at least three hours.

WIND CHILL ADVISORY: Issued when wind chill temperatures are expected to range between -20°F and -35°F.

WIND CHILL WARNING: Issued when wind chill temperatures are expected to be -35°F or colder.

WINTER WEATHER ADVISORIES: Issued for accumulations of snow, freezing rain, freezing drizzle, and sleet which do not meet winter storm criteria, but may cause inconvenience or difficulty to travelers, or to people outdoors.

The following terms may be used to describe winter precipitation.

SNOW FLURRIES: Light snow falling for short durations. No accumulation is expected.

SNOW SHOWERS: Snow falling at varying intensities

Eye on the Sky is a quarterly newsletter published by the National Weather Service in Louisville, Kentucky for the benefit of Emergency Managers and core storm spotters within our county warning area. We will include articles that provide useful seasonal information to you. Comments and suggestions are always welcome. Please send us an email at w-lmk.webmaster@noaa.gov at any time.

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Chief Editors: Ted Funk and Van DeWald

for brief periods of time. Some accumulation is possible.

SNOW SQUALLS: Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant. Snow squalls are most common in the Great Lakes region.

BLOWING SNOW: Wind-driven snow that reduces visibility and causes significant drifting. Blowing snow may be snow that is falling and/or loose snow on the ground picked up by the wind.

SLEET: Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects. However, it can accumulate, like snow, and cause a hazard to motorists.

FREEZING RAIN: Rain that falls onto a surface with a temperature below freezing. This causes the liquid rain to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Even small accumulations of ice can cause a significant hazard.

For road conditions, please call 1-800-261-7623 for Indiana, or 1-800-459-7623 for Kentucky.

Senior Forecaster Retires After 31 Years of Service

by Bob Klein
Senior Forecaster

After more than 31 years of Federal Service, I have decided to try to resume a normal life without rotating shifts, holidays spent working, and working severe weather. As of Sunday, December 3, 2000, I will be officially retired.

It has been a remarkable career, the last 21 years spent here in my hometown of Louisville. I have been very fortunate to have met and worked with some wonderful people over the years, both in and out of Government Service. I have seen many technological changes over the course of my career that have altered the way we do our job, and hopefully have made us better forecasters and provided our customers with an improved product.

I received my initial meteorological training in the United States Air Force. I remember not having the foggiest idea what a meteorologist was when I first started. I began my National Weather Service career at the National Meteorological Center in Washington, D.C. on April 1, 1974. I'm sure many people remember what happened just a few days later, quite an introduction to meteorology. After about 4 years in Washington D.C, I was selected for a forecaster position in Sioux Falls, South Dakota. I still remember my father-in-law thinking that must be the end of the earth, but shortly after we arrived, he along with other members of my wife's family came to visit. Of course while they were visiting, we had a tornado touchdown about 4 miles from our home. While my wife and children huddled under a work bench in the basement, my father-in-law and brother-in-law raced into the backyard to see if they could spot the tornado.

My family and I arrived in Louisville shortly before Christmas in 1979. I remember celebrating Christmas that year in a motel with three young children, quite an experience. Since then, I have had the privilege of experiencing many of the major weather events that have occurred in Kentucky over the past 20 years, including the Bullitt County tornado, the Leitchfield tornado, the east coast blizzard in March 1993, the record breaking snowfall and cold in January 1994, and several episodes of Ohio River flooding, just to name a few.

I really do feel very fortunate though. It is not very often that a person gets to do something they thoroughly enjoy, in a place they really love. I'm sure that, in spite of looking forward to retirement, I will miss the excitement of severe weather, winter storms, and just the everyday challenge of trying to predict what Mother Nature will throw at us next.

Indeed, it has been a pleasure. Best wishes in the future.

Winter Precipitation Type Forecasting: Is it Over our Heads?

by Ted Funk
Science Officer

Now that colder weather has arrived, weather forecasters must not only predict daily surface temperatures (where we live), but we also must know the temperature profile several miles above our heads. This is because temperatures aloft are just as, and sometimes even more important than surface temperatures in predicting precipitation type in the winter.

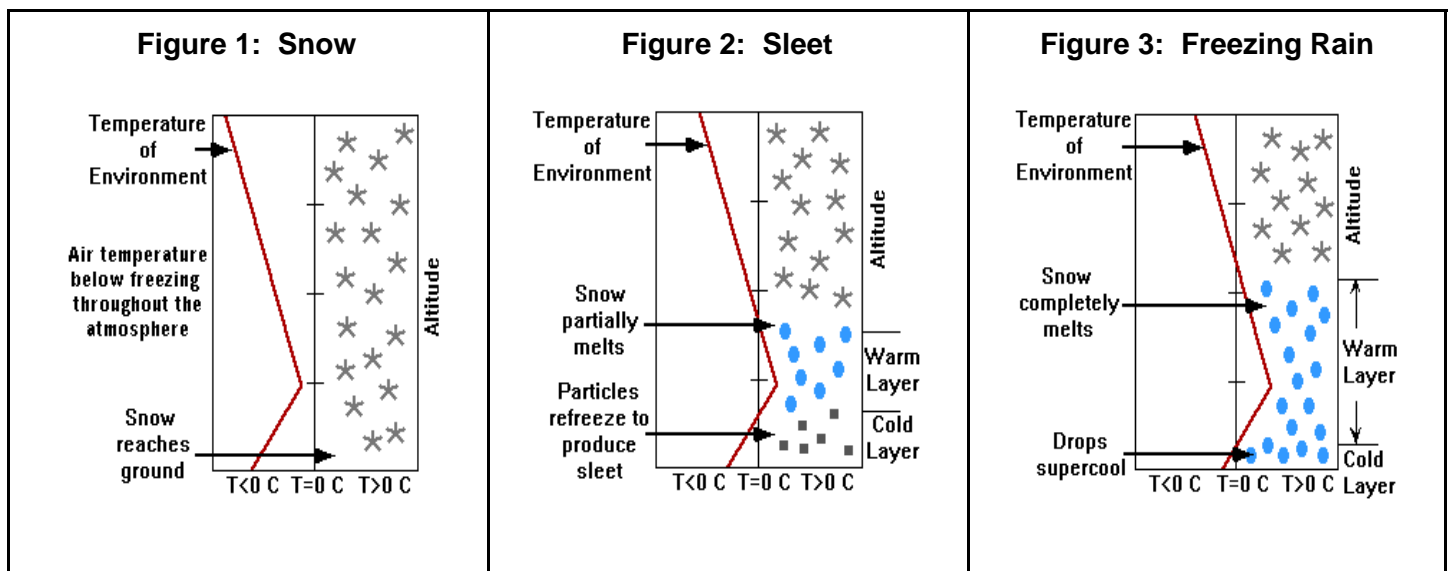
Accurate prediction of precipitation type can be a significant challenge in the Ohio Valley, as snow, sleet, freezing rain, rain, or a mixture of precipitation can occur. To meet this challenge, forecasters evaluate atmospheric soundings which show vertical profiles of temperature and moisture from the earth's surface to about 40,000 feet above the surface at any given location. Of particular importance are temperatures in the clouds where precipitation forms and grows, and temperatures below the clouds which affect what will happen to the

precipitation as it falls to the ground.

Cloud temperatures dictate whether ice crystals or liquid droplets will form. Precipitation particles form on atmospheric condensation nuclei, i.e., tiny air particles such as dust, clay, and aerosols. For these nuclei to support ice crystal formation in abundance, air temperatures aloft normally must be about 10°C below freezing (0° C/32° F). If cloud temperatures are at or just a few degrees below 0°C, then supercooled liquid droplets likely will form, while temperatures above 0°C will result in ordinary liquid droplets. These precipitation particles then grow in the clouds through several physical processes and begin falling to the earth.

Once forecasters determine what type of precipitation particles will form within the clouds, they must evaluate temperatures in and below the clouds to determine ultimately whether snow, sleet, freezing rain, or rain will occur at the surface. Snow occurs when cloud temperatures are cold enough to form and grow ice crystals, and remain at or below freezing all the way to the surface (*Figure 1*). If the snow encounters a shallow layer of air aloft that is a degree or two above freezing, then the snow will melt partially. If surface temperatures are then below 0°C, the particles will refreeze to cause sleet at the surface (*Figure 2*). In other words, sleet or ice pellets are refrozen mixed snow/water particles. If the warm layer aloft is deeper and warmer, then complete melting of the snow will occur resulting in drops of liquid water. If surface temperatures are then below freezing, the liquid water will become supercooled and freeze on contact with cold surface objects resulting in freezing rain (*Figure 3*). If surface temperatures are above freezing, then just rain would occur.

The movement of weather systems and various processes that occur in the atmosphere can have a substantial effect on temperatures and surface precipitation type. Therefore, precipitation type forecasting in the Ohio Valley will continue to present a significant challenge. Fortunately, the experience and training of the NWS Louisville staff will help to meet this challenge as best as possible this winter. So, the next time you hear precipitation mentioned in the NWS forecast, know that much thinking and effort went into the forecast decision process.



Simplified soundings that show the vertical temperature structure in the atmosphere. In Figure 1, temperatures are below freezing throughout the atmosphere, resulting in snow at the ground. Figure 2 depicts a shallow warm layer aloft, which causes snow falling from above to melt partially, then refreeze to sleet in the cold surface layer. Figure 3 shows a deeper warm layer aloft, causing complete melting of snow, which then becomes freezing rain due to subfreezing surface temperatures.

Doppler Radar on the Internet

by Rob Cox

Doppler Radar Program Leader



When the NWS Doppler radar network was established, a long-term agreement was made with four commercial vendors (now 3) to distribute radar information. These NEXRAD Information Dissemination Services providers access all Doppler radar sites across the country and make data available to subscribers. This agreement expires December 31, 2000. After that time, the National Weather Service will make a basic suite of radar products directly available to our users in near realtime.

This information will be available on the Internet and will contain data from *all* Doppler radar sites in the continental United States, in addition to Hawaii, Alaska, Puerto Rico, and Guam. Emergency Managers especially will find this data very useful because it will be available within 2 to 5 minutes of generation. Depending upon the operating mode of the radar, new data will be available as soon as every 5 or 6 minutes, or as long as every 10 minutes.

The entire collection of images will be available via one central location on the Internet at weather.noaa.gov/radar/national.html. This site also will contain information about how to correctly interpret the radar data and will describe how the radar operates. There will be four products available via the Internet. They are:

Base Reflectivity (lowest elevation): This product displays echo location and intensity measured in dBZ (decibels of Z, or simply a measure of the energy reflected back to the radar). This product is very useful in depicting areas of precipitation, evaluating storm structure and hail potential, and other atmospheric conditions.

Composite Reflectivity: This product displays the *maximum* echo intensity from any elevation angle on the radar.

One-Hour Precipitation: This product estimates the amount of precipitation that has occurred during the last hour. It is especially useful when assessing the flash flood potential for a particular location.

Storm Total Precipitation: This product estimates accumulated rainfall for a specified period of time, and is also useful for determining flash flood potential.

Initially, only these four products will be available via the Internet. However, additional products can be received through a multicast flow or via standard anonymous File Transfer Protocol (FTP) from file servers at National Weather Service Headquarters.

Climate Overview

by Pat Waidley

Climate Program Leader



The fall season across central Kentucky and south-central Indiana started out with temperatures averaging below normal in September even though there were numerous days in the 80s. The fall season arrived September 22nd and over the following week, overnight low temperatures averaged several degrees below normal, while highs were near normal.

October was a rather strange month. Record lows occurred in the beginning of the month, while record highs occurred in the latter part of the month. Dry weather continued to hurt some areas with less than an inch of rain in October.

Looking ahead to the upcoming months, average temperatures begin to drop as highs gradually fall to around 40 degrees by mid January with average lows falling to the lower 20s. The question many people ask, especially children, is what are the chances of a white Christmas? Historically, the chances are very slim, actually less than 20 percent. The whitest Christmas in Louisville occurred in 1890 when an estimated 5 inches fell, and remember, there were 3 inches of snow on the ground just last year. Elsewhere, in 1963 a storm left 7 inches on the ground in Bowling Green and 5 inches in Lexington on Christmas.

	December	January	February
Normal Highs	41° - 50°	40° - 43°	41° - 50°
Normal Lows	25° - 33°	22° - 25°	24° - 30°
Precipitation	3.5" - 5.0"	2.8" - 3.8"	3.3" - 4.1"
Snowfall	1.5" - 2.6"	3.8" - 5.2"	3.1" - 4.7"

Snowfall for the Season: 10" - 18"

Seven Day Zone Forecasts

by Tony Sturey

Public Forecast Program Leader

Although forecasting the weather across our country remains complex and challenging, recent improvements in data acquisition integrated with increased computing power, have allowed the National Weather Service to make important strides in both the short term and long term forecast venues.

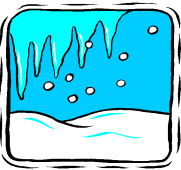
To this end, we are pleased to announce that our regular five day zone forecast has been extended to seven days, effective November 16, 2000. We believe this forecast extension will benefit our users by providing timely and accurate weather information out to a week in advance.

Meanwhile, additional forecast product changes are slated for calendar year 2001. One such change will be the issuance of a "tabular" Kentucky and Indiana state forecast product. More on this, and other changes, will be made available in future newsletters.

Winter Storm Reports

by Van DeWald

Internet Program Leader



Winter storms potentially can be just as, if not more troublesome than severe weather because of the prolonged duration of the events. One of the major challenges that we still face as an organization is receiving timely and accurate storm reports from you. This information is extremely important and is used to determine the severity of a winter storm, and to provide necessary details to the general public which may ultimately save lives. The information is also used for verification and training purposes so that we may better serve you in the future by providing more detailed, accurate warnings and forecasts. With all of the wonderful technology we now possess, reliable and timely storm reports still are a great and essential asset and are vital to the successful implementation of our mission!

Throughout the winter, if you have important weather-related information, such as snowfall amounts, ice accumulations, or anything significant to report, please pass this information along as soon as possible. You

can send us a report via the Internet at www.crh.noaa.gov/lmk/storm_report.htm at any time.

Storm reports are most useful if disseminated in near realtime so the data can be used immediately by forecasters in preparing additional statements, warnings, or advisories. However, delayed reports are still very useful for providing storm summaries, additional details, or facts not otherwise known.

We encourage you to provide accurate and timely storm reports as often as possible. Your observations will assist the National Weather Service with our warning program and you may be providing life-saving information to the citizens of your communities.

Hydrologic Highlights

by Mike Callahan

Service Hydrologist

The drought of 2000 is still not over, especially if you live in south-central Kentucky. Precipitation in September across the area was about an inch or two above normal, with the heavier amounts across north-central Kentucky and south-central Indiana. October was very dry, with most locations receiving less than an inch of rain which was about 2 inches below normal. So far, November has been mixed across the area. Rainfall is about an inch above normal in northern portions of the forecast area, and an inch below normal in southern portions. Since the beginning of the year, precipitation in Bowling Green is about 9 inches below normal, Lexington is about an inch shy of normal, while Louisville is above normal.

As of mid November, looking at the Palmer Drought Severity Index, central Kentucky was still in a mild drought. The drought had ended in south-central Indiana and the Bluegrass region. A few communities still were having problems with water supplies.

The outlook for the winter calls for normal precipitation for this region. If this is the case, the drought which started last year should be over by next spring. Of course, we may have to start thinking about the other end of the water spectrum, floods. Most floods in this area occur during the winter and spring months.

Astronomical Events

The final eclipse of the Second Millennium is a partial solar eclipse on Christmas day. Fortunately, the event will be well placed for observers throughout most of North America. The first and last penumbral contacts occur at 15:26:37 UTC (10:26 PM EST) and 19:43:12 UTC (2:43 PM EST), respectively.

For a detailed map of viewing locations, please check the Internet at:

sunearth.gsfc.nasa.gov/eclipse/OH/PSE2000Dec.gif

While the meteorological start of the winter typically is December 1, astronomically, winter officially begins on the Winter Solstice, December 21, 2000 at 8:37 AM EST.

Our Mission: The National Weather Service provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community. It is accomplished by providing warnings and forecasts of hazardous weather, including thunderstorms, flooding, hurricanes, tornadoes, winter weather, tsunamis, and climate events. The NWS is the sole United States OFFICIAL voice for issuing warnings during life-threatening weather situations.



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